The microstructure of coaching practice

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The microstructure of coaching practice: behaviours and activities of an elite rugby union head coach during preparation and competition.

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Abstract

The activities and behaviours of a female head coach of a national rugby union team were recorded in both training and competition, across a whole rugby season, using the newly developed Rugby Coach Activities and Behaviours Instrument (RCABI). The instrument incorporates 24 categories of behaviour, embedded within three forms of activity (training form, playing form and competitive match) and seven sub-activity types. In contrast to traditional drill-based coaching, 58.5% of training time was found to have been spent in playing form activities. Moreover, the proportion of playing form activities increased to a peak average of 83.8% in proximity to the team's annual international championship. Uniquely, one of the coach's most prolific behaviours was conferring with associates (23.3%), highlighting the importance of interactions with assistant coaches, medical staff and others in shaping the coaching process. Additionally, the frequencies of key behaviours such as questioning and praise were found to vary between the different activity forms and types, raising questions about previous conceptions of effective coaching practice. The findings are discussed in the light of the Game Sense philosophy and the role of the head coach.

1.0 Introduction

Systematic behavioural observation, that is the systematised description of behaviours and actions witnessed during coaching practice, is one of the methodological foundations upon which the field of coaching research has been built (Abraham & Collins, 2011; Gilbert & Trudel, 2004). A desire to better understand the coaching process and exactly *what* it is that coaches do while engaged in it (Brewer & Jones, 2002), as well as the predominance of a quantitative epistemology in coaching science (Gilbert & Trudel, 2004) has led to such a position. As a result of this disciplinary thrust over the last forty years, certain behaviours have been identified that broadly typify the coaching role: monitoring, instruction, correction, feedback and management of the training environment (Douge & Hastie, 1993; Kahan, 1999). However, beyond these generalities, the collective data also show that the specific nature of coaching practice, the frequencies, rates, timings and durations of behaviour, varies from coach-to-coach and between coaching contexts (Potrac, Jones, & Cushion, 2007). Consequently, despite the availability of data from numerous settings, "we cannot blithely assume the transfer of research findings from one context to another" (Harvey, Cushion, & Massa-Gonzalez, 2010 p.364).

Reflecting an evolved understanding of its complexity, coaching has more recently been acknowledged to be a context-specific and social process that is also serial and emergent (Jones, Armour, & Potrac, 2002; Potrac, Brewer, Jones, Armour, & Hoff, 2000). Relatedly, research has shown that a coach's activities and behaviours must be adaptable to the evolving circumstances of the coaching context (e.g., Saury & Durand, 1998) and that they will interact with a variety of associates in the coaching process, including assistant coaches (Jones, 2009) and administrators (Potrac & Jones, 2009) among others (Côté & Gilbert, 2009; Lemyre, Trudel, &

Durand-Bush, 2007). However, systematic observation research has typically been carried out over short periods of time or in isolated clusters (e.g., Cushion & Jones, 2001), which cannot reflect the dynamic or adaptable nature of coaching practice over extended and successive periods (e.g., a season). Furthermore, the majority of studies have taken place in training settings (preparation), ignoring competition (Smith & Cushion, 2006), and little if any detail is usually given of the specific tasks and activities in which the coach conducts their practice (the immediate context of coach behaviour). Finally, the categories of almost all systematic observation instruments focus only on the behavioural interactions between coach and athlete; they ignore the relations maintained between the coach and a multitude of other associates within the coaching process.

Despite these issues, the objective description of coaching practice is essential to the continued study of the coaching process (Cushion, Harvey, Muir, & Nelson, 2012). Systematic observation in varied coaching contexts can help to identify both the similar and distinct features of coaches' practice; those things that allow us to recognise coaching (and perhaps different types of coaching) when it happens (Cushion, 2007). Indeed, it has a functional role to play in developing a fundamental understanding of *what* coaches do, which is a necessary step to investigating *how* and *why* coaches practice in particular ways, and to evaluating different approaches to practice in terms of their effectiveness (Brewer & Jones, 2002). In the light of this, the procedures and systems of systematic observation must be refined to address their identified limitations. To some extent this has already begun with the addition of activity classification (time-use analysis) to systematic observation designs, which embeds behavioural data within an understanding of its local context (e.g., Ford, Yates, & Williams, 2010). Moreover, digital technologies such as audio-visual

recording and computer-based analysis have been used to embrace the multi-level complexity of the microstructures of coaches' practice, which is beyond the reach of simple hand notation (Cushion, Ford, & Williams, 2012; Partington & Cushion, 2013). For example, a coach's simultaneous delivery of correction and positive demonstration behaviours can be recorded retrospectively using a computer and video footage; where live hand-notation could only capture individual behaviours in their sequential order.

To date, only a handful of studies have been published that report systematic observation data contextualised by classifications of the activities and tasks in which coach behaviour occurs. Ford *et al.* (2010) found that youth soccer coaches used an average of 65% drill-like training form activities and 35% game-like playing form activities. Similarly, Partington and Cushion (2013) (53% training form; 47% playing form) in male professional youth soccer, and Low *et al.* (2013) (69% training form; 19% playing form) in male youth cricket, found that the greatest proportion of training time was spent in less game-like activities. Finally, Harvey and colleagues' (2013) study of three collegiate field hockey (41% training form; 35% playing form), basketball (41% training form; 36% playing form) and volleyball (45% training form; 39% playing form) coaches also reported a preference for training form activities.

Generally, the findings of existing coaching practice research have been at odds with the rhetoric of game-centred approaches to coaching (Harvey & Jarrett, 2014). This includes the Game Sense coaching philosophy, which is espoused by researchers (e.g., Evans & Light, 2007; Light & Evans, 2010; Thomas & Wilson, 2014) and promoted by several governing bodies of rugby union (Harvey & Jarrett, 2014; Light, 2013; Reid, 2003). The Game Sense approach places practical emphasis on developing training activities that reflect the demands of actual matches, providing

opportunities for players to develop the skills (perceptual, cognitive and motor) relevant to successful competitive performance (Low *et al.*, 2013). Moreover, game-centred approaches have been heralded as the contexts in which coach behaviours that support long-term learning will be more likely to occur (Partington & Cushion, 2013). For example, questioning behaviours are advocated in Game Sense coaching because they promote athletes' problem solving skills and performance awareness (Chambers & Vickers, 2006), and high levels of praise have been associated with creating a positive learning environment (Cushion & Jones, 2001; Potrac, Jones, & Armour, 2002).

Despite such general guidance, clear and specific details about what Game Sense coaching actually looks like have yet to be published. Some commentators have simply advocated a greater proportion of playing form (PF) than training form (TF) activities; while a more radical view has suggested the excision of training form activities all together (Williams & Hodges, 2005). This lack of clarity surely contributes to making the planning and implementation of Game Sense coaching a daunting prospect for coaches (Thomas, Morgan, & Mesquita, 2013). Indeed, Thomas *et al.* (2013) recently highlighted a number of real world challenges and issues that coaches who follow contemporary philosophies such as Game Sense may face. In other words, the idealistic rhetoric of a coaching philosophy is unlikely to be seamlessly achieved in the complex and messy realities of coaching pedagogy. Therefore, more authentic and detailed pictures of coaching practice are needed; pictures that help to establish *what* Game Sense actually looks like and *how* it can be implemented through a coach's behaviours and activities.

In the light of the issues raised, the value of combining time-use and behavioural analysis is that the resultant pictures of coaching can provide coaches

with a platform to critically reflect upon the relations between their own coaching practice and players' learning and development (Cushion, Ford, et al., 2012). Moreover, by establishing a database of similar studies we might begin to identify consistencies in *how* coaches implement different coaching styles or philosophies effectively, which will support the work of coach educators and practitioners alike. To promote these outcomes, other issues in the design of research concerned with *what* coaches do still need to be addressed. Firstly, the activities and behaviours that comprise coaching practice during competition remain under-researched (Smith & Cushion, 2006). Secondly, the dynamic, evolving nature of coaching practice between different contexts (e.g., training and competition) and across extended periods (e.g., whole seasons) is little understood. Finally, the extent of interactions between the coach and their associates in the coaching process has yet to be identified.

Beginning to address these and other issues are key objectives of this study. Specifically, we aim to contribute practice data from the sport of rugby union, which is surprisingly absent from coach behaviour research (Gilbert & Trudel, 2004; Kahan, 1999). Despite being a globally recognised and played sport, to our knowledge, there has been only one study of coaching practice in elite rugby union (Mouchet, Harvey, & Light, 2014), which only examined coaches' communication during competition rather than their broader behaviours and coaching activities. Additionally, there have been far fewer studies of female coaches than males, and much less work has been completed at the highest level of elite international competition than with university-level coaches (Gilbert & Trudel, 2004). Therefore, the present research examines the microstructure of coaching practice of the female head coach of a national rugby union team, throughout a whole season, during both training and competition. Though exploratory and descriptive by its nature, it is hoped that such "bottom-up" empirical

work, from which basic understanding and knowledge of coaching practice is accumulated, will act as the foundation to higher levels of research and to greater self-awareness for coaches (Gilbert & Trudel, 2004).

2.0 Methods

2.1 Coach and context

The female head coach of a national rugby union team participated in a season-long investigation of coaching practice during training and competition. The research context would be described as an elite domain of coaching according to Trudel and Gilbert's (2013) definitional criteria. The coach had eight years of coaching experience at the start of the study and had achieved the second highest certificate of coach education available via her sport's governing body. The team's players were all amateur, while the head coach, herself employed on a part-time basis, oversaw a mix of part- and full-time regular support staff including two assistant coaches, a doctor, a physiotherapist, two strength and conditioning instructors, and a team manager. Where coaches' or players' names are referred to in the sections that follow pseudonyms have been used to protect their anonymity.

2.2 Instrumentation

A new instrument was developed for the present study, which incorporated adapted versions of Brewer and Jones' (2002) Rugby Union Coach Observation Instrument (RUCOI) and Ford and colleagues' (2010) time-use categories. The Rugby Union Coach Observation Instrument was chosen for several reasons related to the aims of this study. Firstly, it was the only existing rugby-specific behavioural observation

instrument, and it had been validated using elite-level coaches. Secondly, the instrument, rather uniquely, already contained a "conferring with assistants" category, which recognised the importance of the coach's interactions with more than their players alone. Adaptations were necessary to ensure that the new instrument was relevant to the context of the present research, specifically, that it was inclusive of coach behaviours and activities in elite women's rugby union and for use in both preparation and competition settings.

The development of the new instrument was regulated by Brewer and Jones' (2002) five-step validation process, which has been used in several recent coach behaviour studies (Partington & Cushion, 2013). Initially, the lead researcher became familiarised with the Rugby Union Coach Observation Instrument and time-use instrument, gaining an in-depth understanding of their categories over a four-week period (Lacy & Darst, 1989). This included repeated practice using video footage of five elite rugby coaches, with gaps of 24 hours, seven days and 14 days to allow for memory lapse (Lacy & Darst, 1989). The familiarisation stage was concluded when mean retest agreements exceeded 80% (Siedentop & Tannehill, 2000). The Rugby Union Coach Observation Instrument and time-use instrument were then combined and the new instrument - hence referred to as the Rugby Coach Activities and Behaviours Instrument - modified to achieve contextual relevance for both training and match activities. This process was facilitated by discussions with a researcher who was both experienced in observational analysis and also a former women's rugby union international. Discussion focussed on the clarity of definitions and the authenticity of example descriptions. Modifications to the behavioural categories of the Rugby Coach Activities and Behaviours Instrument included the addition of a "commentary" category to account for the coach's verbal descriptions of observable

training or match action when uttered aloud and appearing to only be for the benefit of the coach and no one else. The "questioning" category's definition was also modified to include instances when the coach listened to players' verbal responses to questions, when the coach was asked a question by a player, and when the coach responded to a player's question in a way that did not fit another of the predefined categories (e.g., "technical explanation"). Similarly, "concurrent instruction" was refined to include verbal reminders or cues given to players that a referee might give during a match. For example, a coach could remind defensive players to stay onside, which a referee would do during a match. Additionally, "conferring with *assistants*" became "conferring with *associates*", to account for the head coach's interactions with various people connected to the coaching process. A "competitive match" category was also included in the contextual components of the Rugby Coach Activities and Behaviours Instrument, accounting for the coach's actions during competitive events as well as activities more usually associated with the preparation setting (e.g., skills and technical activities). Third, face validity was then obtained for the instrument. A panel of specialists including elite women's rugby union coaches (n = 4) and experienced researchers (n = 2) reviewed the categories and definitions to ensure that they were representative of elite women's rugby union coaching. Finally, intra-observer and inter-observer reliability were then calculated to ensure consistency in the recording of behavioural information using the modified instrument. Categories and definitions of the Rugby Coach Activities and Behaviours Instrument are shown in Table 1.

****Table 1 near here****

2.3 Procedures

Every training session (n = 14) and competitive match (n = 6) throughout the season was recorded using a high-definition digital video camera (Sony HDR-XR160), mounted on a manoeuvrable tripod (Sony VCT-R640). Off-pitch activities, such as the half-time team talk were not recorded as part of this study. As the venues of training sessions and competitive matches varied, the camera's placement also varied; however, it was always positioned so as to capture the coach's movements and behaviours, as well as their context - the activities of the players and associates she observed or interacted with. During training and matches the coach wore a clip-mounted microphone (Sennheiser EW100G2) that transmitted to a receiver on the video camera, which allowed the simultaneous recording of video and audio signals. However, weather conditions, as well as signal interference caused by other broadcasting media at international matches prevented the clear recording of audio at all times. In spite of this, 1031.2 min of behavioural observation was recorded in the present study, which vastly exceeded the 270.0 min Brewer and Jones (2002) concluded was sufficient to observe the full scope of coach behaviours in their paper.

Coaching practice data were analysed using the computer software, Focus X2. Focus X2 allowed the keyboard to be configured to record the frequency of each Rugby Coach Activities and Behaviours Instrument category by depressing the appropriate keys. Following each training session and competitive match, the footage was watched in full by the lead researcher. The sequence of coaching activities was analysed using a continuous recording method (Darst, Zakrajsek, & Mancini, 1989), with the start and end times of each activity type recorded. Mean intra-observer (99.0%) and inter-observer (99.0%) reliability suggested a high level of consistency and accuracy in the time-use analysis.

Analysis of coach behaviour followed a similar procedure to Rushall's (1977) time-sampled event method. When a behaviour matching a predefined category of the Rugby Coach Activities and Behaviours Instrument was first observed, a behavioural log was created. Initially, the type of activity was selected, before the relevant behavioural key was depressed. This process was repeated for each new behaviour. Where a behaviour continued for three seconds, the button was depressed again and the word "continuation" added to its individual behavioural log. Therefore, coaching practice could be reported in terms of specific behavioural events as well as the intervals of time spent in each behavioural category, and according to the specific activity context of the behaviour. To ensure that the behavioural coding process was as rigorous as possible, inter-observer and intra-observer checks were carried out. Mean intra-observer agreement (Event 82.0%, Interval 87.0%) and inter-observer agreement (Event 80.0%, Interval 81.0%) with the Rugby Coach Activities and Behaviours Instrument met or exceeded the accepted level of 80.0% (Siedentop & Tannehill, 2000).

2.4 Data presentation

The durations spent in the three activity forms and their sub-activities were calculated as a percentage of the total duration of coaching activity recorded during training and match days. Overall totals, percentages, standard deviation, rate per minute and ranks were calculated for each behaviour category across the eight training and three competitive matches and in relation to each activity and sub-activity type. Percentages have been recommended and widely used in recent coach behaviour studies (e.g., Partington & Cushion, 2013; Potrac et al., 2002; Potrac et al., 2007; Smith &

Cushion, 2006) as a more reliable variable than frequency data, which could vary in relation to the duration of a training session or match (Ford *et al.*, 2010). However, “use of name”, by its nature, always accompanies other behaviours and would therefore distort the true percentages of other behavioural categories if included in the overall calculations (Lacy & Darst, 1989). Use of name was therefore excluded from the overall calculations, but divided by the total number of independent behaviours to give the percentage of behaviours accompanied by a use of name.

3.0 Results

Of the activity recorded, training accounted for 67.6% and matches for 32.3% of the coach’s "on-pitch time" with the team. The mean duration of training sessions was 100.7±36.2 min, which included an average of: 10.1±5.9 min of fitness activity; 8.0±14.6 min of technical activity; 23.5±22.2 min of skills activity; 44.5±22.0 min of phase of play activity; and 14.3±18.6 min of conditioned games activity. No small-sided games were recorded during the season. Therefore, training sessions were predominantly comprised of playing form activities (58.5%), with less time spent in training form activities (41.5%). The durations of each sub-activity type during every training day of the whole season are shown in Figure 1, which highlights the variance in total duration and the time spent in individual activities from session to session and across the season. For example, it was notable that mean training session duration was generally shorter on the days immediately before competitive matches (68.6 min) (highlighted with an *) than during the rest of the season (124.7 min).

****Figure 1 near here****

On match days, competitive match play was always preceded by a distinct warm up. Mean match day warm ups lasted for 24.0±4.4 min, and included an average of 5.9±1.6 min of fitness activity, 3.3±1.8 min of technical activity, 9.3±1.9 min of skills activity and 5.5±2.5 min of phase of play activity. No small-sided games or conditioned games activity was included in match day warm ups. On average, match play lasted for 88.5±5.5 min. This included time added for injuries and stoppages, in addition to the standard 80.0 min of play required by rugby union's laws. Thus, training form activities (16.5%) and playing form activities (4.9%) accounted for a much smaller proportion of match day activities than match play itself (78.7%). The durations of each sub-activity type during every match day of the whole season are shown in Figure 2.

****Figure 2 near here****

A total of 10,262 event and 23,550 interval behaviours were coded from 1031.2 min of video and audio recordings. Overall, the most frequent behaviour type was observation (22.1%), while conferring with associates (15.4%), management (10.6%), questioning (5.9%) and concurrent instruction (5.9%) were also among her most prevalent behaviours. Interval behaviours ranked in a slightly different order. Specifically, she spent the most time in observation (30.8%), conferring with associates (23.3%), management (7.4%), questioning (6.3%) and correction (5.8%). This shows that although the coach engaged in concurrent instruction more often than she offered correction, it took up less time. The least common behaviours throughout the season were praise (general) (0.2% event; 0.1% interval), scold (general) (0.2% event; 0.2% interval), concurrent scold (0.4% event; 0.2% interval), negative demonstration (0.5% event; 0.3% interval) and use of humour (0.7% event; 0.3%

interval). Cumulative behaviours for every training sessions and match are shown in Table 2.

****Table 2 near here****

The coach's behaviour was found to vary according to its context. At a broad level, some behaviour differed notably between training days (preparation setting) and match days (competition setting). For example, proportionally more time was spent giving preinstruction during preparation (4.4%) than in competition (1.6%). Similarly, more time was spent in technical explanation (preparation 6.3%; competition 1.1%), correction (preparation 7.9%; competition 1.4%), questioning (preparation 9.0%; competition 0.8%) and management (preparation 8.8%; competition 4.3%) during training days. Conversely, conferring with associates (preparation 19.7%; competition 30.9%), other (preparation 1.3%; competition 3.8%), observation (preparation 26.3%; competition 40.4%) and commentary (preparation 0.9; competition 7.6%) accounted for a much greater proportion of interval behaviours during match days than training days.

At a more micro-contextual level, behavioural variation was also found between the activity sub-types of the Rugby Coach Activities and Behaviours Instrument. For example, names were used more frequently during skills activity (1.9 per min) than fitness activity (0.5 per min), while conferring with associates occurred less regularly during skills activity (0.5 per min) than any other activity (fitness 1.1 per min; technical 1.1 per min; phase of play 1.2 per min; conditioned games 1.2 per min; competitive match 2.4 per min). Furthermore, time (interval) spent giving concurrent praise was greatest during technical activity (4.3%) than at any other time (fitness 0.5%; skills 1.2%; phase of play 0.8%; conditioned game 1.9%; competitive

match 0.3%) and scold (skill) was rarely used in fitness (0.0%), technical (0.5%) and competitive match (0.0%) activities, compared to skills (2.8%), phase of play (3.8%) and conditioned games (4.2%) activities.

4.0 Discussion

It is impossible within the limits of this paper to discuss all aspects of the coach's complex and holistic "on-field" practice. Consequently, the following discussion is necessarily selective. First, the coach's activities and behaviours are examined in the light of the Game Sense philosophy of coaching. Then, one of the coach's most prevalent behaviours, conferring with associates, is explored in further depth.

4.1 A Game Sense philosophy in practice?

Although there are no comparable practice data specific to rugby union, research has previously found that athletes tend to spend more time during training sessions in what Ford *et al.* (2010 p.492) described as “less relevant” training form activities than “more relevant” playing form activities. These authors used “relevance” to describe how closely training is related to actual performance in competition (Ford *et al.*, 2010). In the present study, the majority of training was spent in playing form activities (58.5%). Moreover, the proportion of time devoted to playing form activities increased to a peak average of 83.8% over the final four training days of the season, which occurred immediately before and during the team’s annual international championship. These figures are the highest proportion of playing form activities reported in the coaching practice literature to date. For coaches wishing to create a learning environment that reflects the perceptual, cognitive and motor demands of

competition, the data provides a benchmark for critical reflection upon the microstructure of their own practice. Moreover, in the absence of specific guidelines, the findings might act as a signpost of what a more game-based, Game Sense approach looks like in practice - though it is not intended to be a paint-by-numbers plan that coaches in any context should follow uncritically (Jones & Wallace, 2005).

In terms of broadly classifying training activities, this picture of coaching practice aligns to the principles of the Game Sense approach, which advocates the use of match-relevant games (Light, 2013). This perhaps reflects the context-specific nature of coaching practice in elite international rugby union, where it is important to prepare players for the essential tactical and decision-making facets of competitive performance. Indeed, the findings build upon Ford *et al.* (2010), who noted that elite youth soccer teams engaged in greater proportions of playing form activities than sub-elite and non-elite teams. Furthermore, a traditional focus on the introduction and improvement of skills and techniques at collegiate, recreational or developmental levels might account for the lower amounts of playing form activities reported in other research conducted in those contexts (Trudel & Gilbert, 2013). However, given the variety of positive outcomes for athletes associated with Game Sense coaching including learning, performance and enjoyment (Light, 2013), coaches at all levels should carefully consider if their current practice aligns with existing markers of effective coaching practice (see Côté & Gilbert, 2009; Côté, Young, North, & Duffy, 2007).

Despite utilising more game-like activities than has typically been found before on average the coach still spent a notable amount of time in training form activities. It has been suggested that one advantage of training form activities is that the number of skill execution opportunities are significantly higher, resulting in more

rapid short-term performance gains (Gabbett, Jenkins, & Abernethy, 2009); or as Williams and Hodges' (2005) put it, "while specific, blocked practice is better for performance, variable, random practice is more effective for skill learning" (p.643). This finding is perhaps unsurprising given the importance of competitive performance in international rugby union and the limited number of training sessions that the national team had together to prepare for their annual championship. Moreover, in contrast to Partington and Cushion's (2013) suggestion that playing form activities are the greatest catalyst for increased praise and questioning behaviours, in the present study, the combined categories of praise (3.6 per min in training form; 1.1 per min playing form) and questioning (4.3 per min in training form; 3.7 per min in playing form) were in fact most frequent in training form activities.

It is possible that the reason more playing form activities were not used was because some training games actually lack relevance to elite competitive performance. For example, games of "touch" are widely used in rugby coaching, in which full-contact tackling is replaced with a simulated touch. "Touch" would be classified as a conditioned game according to the Rugby Coach Activities and Behaviours Instrument. However, by implementing this one condition a fundamental aspect of match-like realism would be removed, and the coach would have to explain several other conditions in order to help the players understand the boundaries of the activity. Specifically, players would need to know what happens after the "tackle" (normally a ball carrier would be tackled to the ground); if the defending side can then contest the ball (ruck or maul); and if not, how offside lines will be dictated (this is normally taken from the hindmost point of the ruck or maul). The list could go on. This would increase the need for explanatory preinstruction, which was used much less frequently by this coach (0.28 per min) compared to Partington and Cushion's

findings (1.11 per min, 2013). Similarly, concurrent instruction, to remind the players of the conditions of practice, would likely also increase, the combination of which would lead to less time for the players to actually take part in the activity, or for the to use questioning, praise and other behaviours associated with creating a positive learning environment. As Light and Evans (2010) suggest of Game Sense, rather that by direct instruction, the coach's job is to facilitate learning by the design of the learning environment, using questioning and creating opportunities for players to interact.

While the general principles of the Game Sense approach and similar philosophies (see Harvey & Jarrett, 2014) is to use games in training, the present findings suggest a more complex and critical approach is needed. Put simply, some activities classed as “games” will be more relevant to competition than others. Indeed, in the present study, phase of play activities (playing form) were characterised by one group repeatedly attacking as another defended. The activity was always restarted when the attacking group made a mistake or the defence successfully disrupted them. Consequently, the team rarely practised reacting to changes in possession, making quick transitions from attack to defence and defence to attack following a “turnover”, which often happen during matches. It was therefore of interest, although causality cannot be assumed, that the national team conceded the most points to turnovers lost and they scored the least points from turnovers gained of any team in their major annual international competition. A focus on more transitional and open small-sided or conditioned games may have been more relevant to this particular facet of competitive match play.

These findings demonstrate the complexity of coaching practice, particularly in the elite and team sport context of the present study, where coaches must balance

different priorities in the face of various challenges and constraints to find productive outcomes (Bowes & Jones, 2006). Given the dual importance for this elite coach of short-term performance improvement (e.g., between matches of the annual international competition) and longer-term development (e.g., building towards World Cup qualification), it seems logical that her practice would include a blend of both activity forms. Coupled with the data highlighting greater praise and questioning behaviours in training form activities, these findings challenge simplistic assumptions that one kind of activity (playing form) is inherently better than another (training form). Instead, it is the detailed *how* of each activity, including how it is designed and implemented, that will determine its relevance to competition. Thus, from a practical perspective, coaches must give critical consideration to the specific conditions of practice that all activities create as well as their implications as contexts of learning.

4.2 Conferring with associates: the head coach as orchestrator of the coaching process?

Unlike previous studies, the Rugby Coach Activities and Behaviours Instrument accounted for the coach's interactions with people other than just their players. It was therefore of interest that the coach's second highest ranked behaviour was conferring with associates, which was particularly prevalent during matches (preparation 19.7%; competition 30.9%). Adding to Brewer and Jones (2002) rationale for the inclusion of "conferring" in the Rugby Union Coach Observation Instrument, interactions with associates were found to be influential in the present study and reflected both the social and contextual constitution of the coaching process as well as the significance of the coach's role as a *head* coach.

During training sessions, conferring with associates was essential for the coach to be able to gather and disseminate information with her assistant coaches, strength and conditioning, medical and management staff. The coach's most frequent interactions were with assistant coaches. Topics of communication including suggested alterations to the current activity; checking the assistant was running to the planned schedule; debating the merits of a team tactic or strategy; and sharing opinions about players' performances, work ethic, injuries or recovery, attitudes, and their likely of selection for a forthcoming match. In this sense, conferring reflected the *head* coach's holistic role, with responsibility for orchestrating the overall coaching process, managing players and staff, coaching the players, and "standing back" to gain an overview of the team's progress while her assistant coaches led the direct management of activities.

During matches, according to competition rules, all head coaches were required to sit in an allocated area of the stands. Consequently, the coach and her associates (assistant coaches; medical staff; fitness coach; team manager), who were allowed pitch-side, communicated via wireless radio headsets. Thus, just as Mouchet *et al.* (2014) recently found with elite-level rugby coaches, communication to the players via associates was essential for the coach to be able to influence on-pitch decision making. For example, during match 3 she said to one of her assistants, who was making his way to a huddle of players, "Tell them to attack the wide channel". Other interaction themes included, selection decisions with the team manager, "At the next stoppage, we're going to swap to Gillian for Liz"; fitness queries with the medics, "How bad is Sarah's back, because we need her for the next game?"; and tactical debates with the assistant coaches, "We've got to be attacking outside their thirteen". When intervals of conferring with associates (30.9%) are combined with

silent observation (40.4%), commentary (7.6%) and other (3.8%), it is clear that the coach spent very little time interacting with players during match play. As Trudel *et al.* (1996) have previously suggested, matches simply offered fewer coachable moments, with the coach required to sit in the stands, often too far away from the players to be heard. Indeed, even when she did try to interact with players during match play it was unclear how many of these behaviours were actually received. Additionally, it was noted that almost all of the coach's time categorised as other was actually spent writing notes. In order to reduce the percentage of other behaviours coded in future studies of elite rugby union coaches using the RCABI, an additional category (e.g., "referring to/adding to notes") could be considered for inclusion.

The present data highlight the importance of interactions between the head coach and a variety of associates, which can shape the coaching process in significant ways. For practitioners, this draws attention to differences between the roles of the head and assistant coach, and to the need to understand each other's philosophies, values and expectations about the coaching process. Moreover, for coach developers the findings point to areas where coach education might develop further support. These might include the transition from being an assistant to a head coach, and managing coaching teams and support services. In addition, the present work recognises the coaching process as an inherently social activity that stretches beyond the almost exclusive focus to date upon coach-athlete relations in the literature. Future research should examine the relationships and interactions of head and assistant coaches, medical staff, strength and conditioners, managers and others in in the coaching process. Indeed, it is essential that subsequent systematic analyses of coaching practice include categories that recognise various recipients or instigators of behaviour, not just coaches or players.

5.0 Conclusion

While recognising the limited generalisability of a case-study approach, the present study's findings paint a detailed, contextualised picture somewhat at odds with traditional images of coaching practice (e.g., Cushion, Ford, et al., 2012). Indeed, a profile of behaviour was found that appeared less directive and more facilitatory than other studies have reported. Furthermore, behaviours like praise and questioning, usually related to game-like playing form activities, were actually found to be most prevalent in training form activities. Finally, the present findings included more game-like, playing form activities than has typically been reported before, which was also found to increase as the season moved towards its competitive focus.

Given the limited number of studies of this type and that the present research is the first of its kind to have been carried out in the domain of international rugby union, with an elite-level, female head coach, further research in similar and more diverse contexts is needed. Of the key findings reported here, the relationship between activity type and coaching behaviours associated with developing positive learning environments requires further attention. Research should not only look to increase coaches' self-awareness of *what* and *how* they coach (Partington & Cushion, 2013), perhaps through collaborative action research (Gilbert, 2007), but to also develop more vivid pictures of different coaching philosophies in action. Given the existing support for Game Sense from governing bodies (Harvey & Jarrett, 2014; Light, 2013), such research is necessary if coach education is to best inform coaching practice. In addition, the way in which the coaching process is shaped by interactions between the coach and a variety of associates, as well as their players, is also raised as an

important area for future inquiry. Such research might also address a limitation of this paper: that it does not report *why* the coach constructed her activities and behaviours in the way that she did.

Coaches make decisions about their practice for a range of reasons that result from the interrelationship of personal, social and contextual factors (Côté, Salmela, Trudel, Baria, & Russell, 1995), such as meeting players' perceptions (Jones, 2006; Potrac et al., 2002) and maintaining relationships with assistants or administrators (Potrac & Jones, 2009). Thus, complimentary qualitative methods, such as stimulated recall (Lyle, 2003) offer a means to explore beyond the *what* and *how* of coaching to examine underlying cognitive processes to ascertain the constitution of coaches' behaviours and to understand the intentions, knowledge and experience that guides their practice (Nash & Sproule, 2011; Nash, Sproule, & Horton, 2008). For example, an interpretive approach could be used to examine the absence of any small-sided games in the present findings. In this vein, we support recommendations that interactions between coaches' thoughts, decisions and practice be examined in future research across three time frames: before (knowledge, philosophy and planning), during (behaviours and activities) and after practice (reflection-on-action) (Cushion, Ford, et al., 2012). Indeed, we add our own names to numerous authors of quantitative studies of coach behaviour (e.g., Cushion & Jones, 2001; Ford et al., 2010; Potrac et al., 2007), who acknowledge the need to delve deeper into the *why* and *how* of coaching practice.

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Table 1. Categories and definitions of the Rugby Coach Activities and Behaviours Instrument.

Context	Definition
Training Form	
Fitness	Improving or testing players' fitness (e.g. warm up, cool down, strength and conditioning)
Technical	Isolated technical skills. Unopposed, alone or in a group (e.g. passing, kicking)
Skills	Re-enacting isolated, simulated match incidents with or without a particular focus on technical performance (e.g. lineout, scrum)
Playing Form	
Small-sided games	Match-like play, with reduced numbers of players
Phase of play	Uni-directional match-like play, towards one try line (e.g. one team always attacks)
Conditioned game	As small-sided games, but with variations to rules and areas of play (e.g. no offloads, aim to get 10 passes)
Competitive Match	
Competitive Match	Actual match play

Behaviour	Definition
Use of name	Use of name when speaking directly to a player or associate ("Good pass, Sophie")
Preinstruction	Directional information given to the player before the activity starts. It explains how to execute the drill, task or game. It is about doing the practice, the nature of the practice. (e.g. "Three of you will defend this line...")
Technical explanation	The coach states how the performance or activity relates to the match (e.g. "That's the line you need to take on Saturday")
Concurrent instruction	Directional information, reminders or cues given about the nature of the activity during the activity, or instructions as if from a referee (e.g. "Hit the bag", "Get onside")
Concurrent positive feedback	Positive feedback, specific to the skill or tactic, given during the activity (e.g. "Great hip extension")
Concurrent praise	Non-specific praise given during the activity (e.g. "Excellent", clapping)
Concurrent correction	Information or feedback aimed at improving performance execution during the activity (e.g. "Keep your depth", "Chin off chest")
Concurrent scold	Displeasure at poor performance execution given during the activity (e.g. "That's sloppy passing", shake of the head)
Positive skill-specific feedback	Positive feedback, specific to the skill or tactic, given at the end of a performance or activity (e.g. "Your follow through was better during that last set")
Praise at skill attempt	Non-specific praise given at the end of a performance or activity (e.g. "Good work", thumbs up)
Scold (skill)	Displeasure, specific to the skill or tactic, given at the end of a performance or activity (e.g. "Your follow through was nonexistent")
Correction	Information or feedback aimed at improving performance execution given after the performance or activity (e.g. "Next time, delay your pass")
Questioning	Questions directed to players. Listening to players' responses and listening to players' questions. Responding to players' questions unless falling within another category (e.g. "So, where would we play next?", "You're here, where should you be?")
Positive demonstration	The correct performace, demonstrated physically by the coach
Negative demonstration	The incorrect performance, demonstrated physically by the coach
Hustle	Aimed to intensify effort (e.g. Go,go,go", repeated clapping)
Praise (general)	Praise about general behaviours, such as attitude and effort (e.g. "Great focus today")
Scold (general)	Displeasure about general behaviours, such as attitude and effort (e.g. "You're not listening")
Use of humour	Irony, sarcasm or wit related to the performance (e.g. "My granny could have made that pass")
Management	Organising the activity. Setting out equipment and arranging players (e.g. "Three in tackle suits", putting out cones)
Conferring with associates	Verbal or non-verbal interaction with an associate, other than players ("What do you think of her pass?", "Shall we cut this short?")
Other	Unaccounted for by the other categories or off camera
Observation	Periods of silent, diagnostic observation (clearly attending to the activity in silence)
Commentary	Verbal descriptions of the performance or activity uttered aloud, but not to communicate with players or associates

Table 2. Overall event and interval behaviours coded during the season [total behaviours, percentage of behaviours (%), standard deviation (SD), rate per minute (RPM), rank].

	Event					Interval				
	Total	**%**	**SD**	**RPM**	**Rank**	**Total**	**%**	**SD**	**RPM**	**Rank**
Use of name*	1324	14.81	40.80	1.28	*	1324	5.96	40.80	1.28	*
Preinstruction	286	3.20	13.54	0.28	10	771	3.47	34.21	0.75	7
Technical explanation	269	3.01	19.11	0.26	11	1028	4.63	58.86	1.00	6
Concurrent instruction	523	5.85	17.41	0.51	5	592	2.66	19.11	0.57	9
Concurrent positive feedback	134	1.50	7.30	0.13	17	136	0.61	7.36	0.13	17
Concurrent praise	337	3.77	12.05	0.33	9	345	1.55	12.61	0.33	13
Concurrent correction	204	2.28	8.59	0.20	14	230	1.03	8.97	0.22	14
Concurrent scold	39	0.44	2.01	0.04	21	40	0.18	2.15	0.04	21
Positive skill specific feedback	140	1.57	6.07	0.14	16	200	0.90	10.53	0.19	16
Praise at skill attempt	223	2.49	14.68	0.22	13	225	1.01	14.99	0.22	15
Scold (skill)	225	2.52	14.75	0.22	12	464	2.09	37.15	0.45	10
Correction	520	5.82	22.80	0.50	6	1291	5.81	60.86	1.25	5
Questioning	526	5.88	31.66	0.51	4	1409	6.34	101.43	1.37	4
Positive demonstration	82	0.92	8.30	0.08	18	103	0.46	11.20	0.10	18
Negative demonstration	48	0.54	4.59	0.05	20	60	0.27	5.74	0.06	20
Hustle	385	4.31	15.37	0.37	8	416	1.87	18.17	0.40	12
Praise (general)	13	0.15	1.00	0.01	23	21	0.09	2.22	0.02	23
Scold (general)	21	0.23	2.38	0.02	22	35	0.16	5.09	0.03	22
Use of humour	61	0.68	4.66	0.06	19	67	0.30	5.12	0.06	19
Management	944	10.56	39.96	0.92	3	1640	7.38	64.38	1.59	3
Conferring with associates	1375	15.38	83.07	1.33	2	5177	23.29	210.27	5.02	2
Other	160	1.79	13.93	0.16	15	463	2.08	40.93	0.45	11
Observation	1979	22.14	73.55	1.92	1	6842	30.78	273.56	6.64	1
Commentary	444	4.97	51.14	0.43	7	671	3.02	83.65	0.65	8
Total	10262	100		9.95		23550	100.00		22.8	
Total minus *	8938					22226				

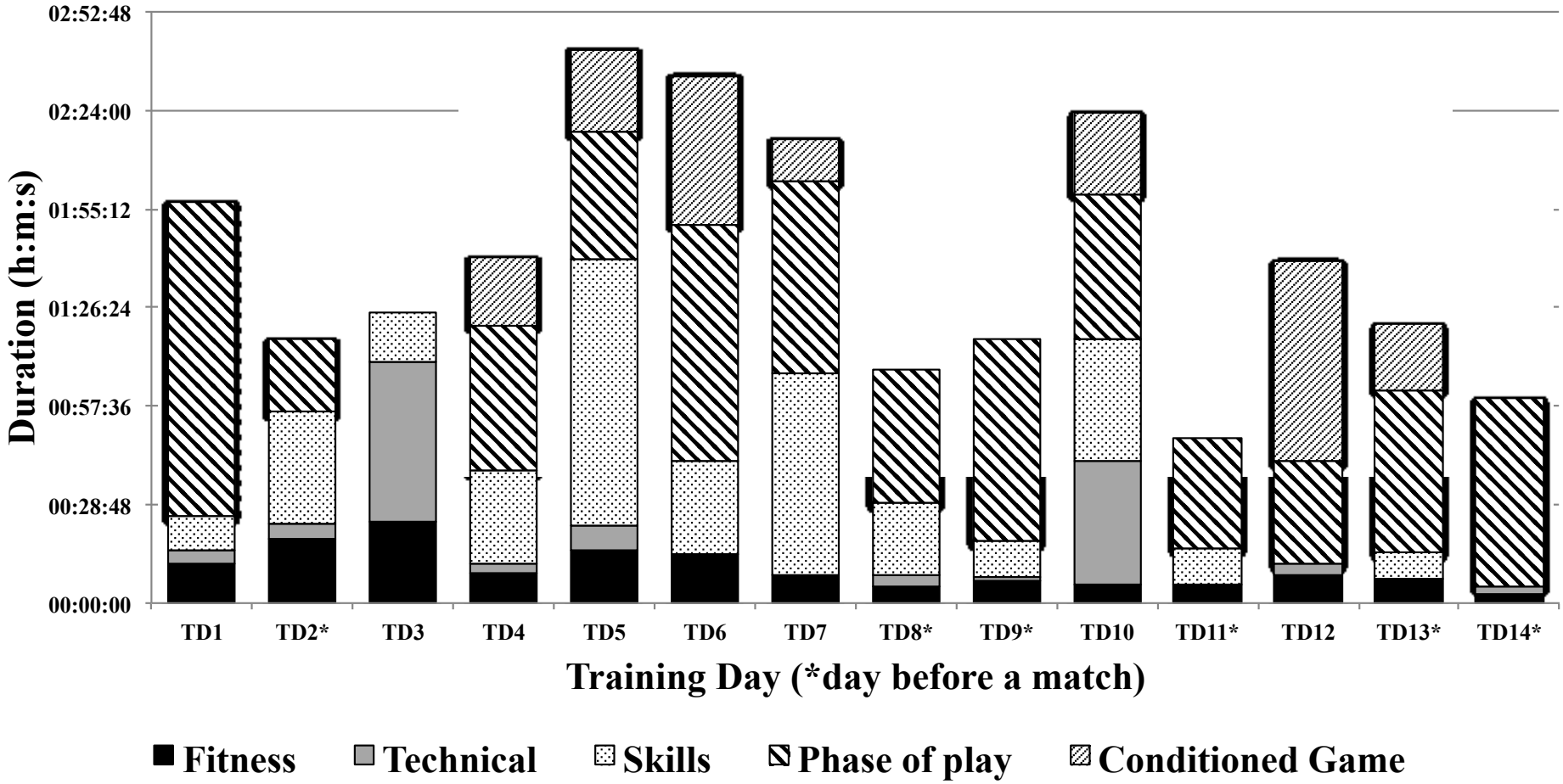

Figure 1. Duration [hours, minutes and seconds (h:m:s)] spent in Fitness, Technical, Skills, Phase of play and Conditioned game activities during each training day (TD), * denotes a training day immediately before a match day.

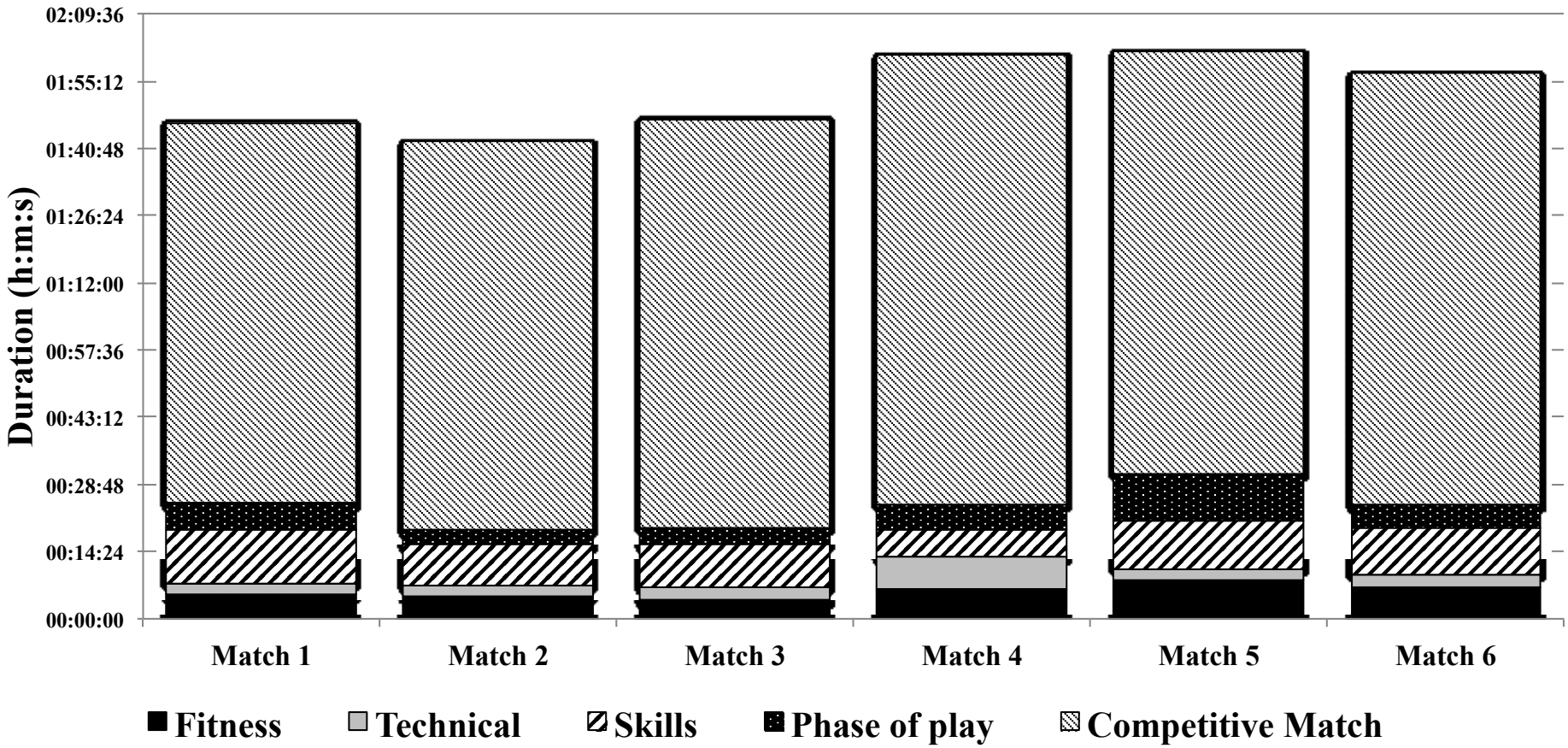

Figure 2. Duration [hours, minutes and seconds (h:m:s)] spent in Fitness, Technical, Skills, Phase of play and Competitive match activities during match days.